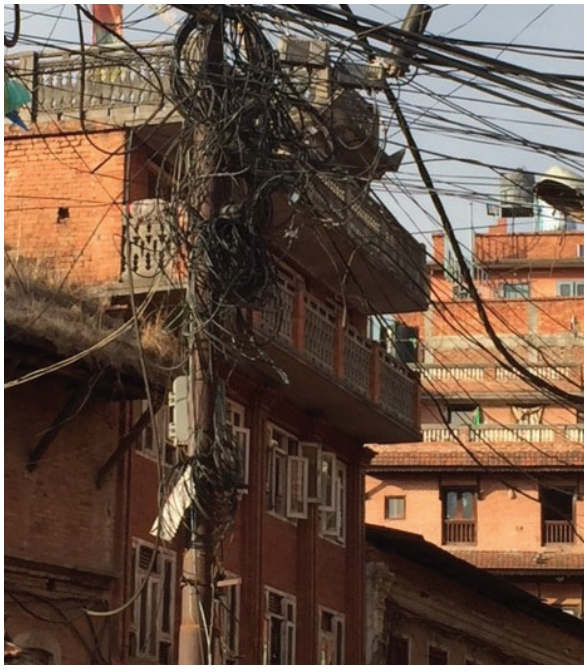
Cities and infrastructures: A view from Kathmandu

Caroline Knowles leads us through a city experiencing radical change

Caroline Knowles is Professor of Sociology at Goldsmiths, University of London, and Programme Director of the British Academy's Cities & Infrastructure Programme.

Through the window of a tiny dilapidated taxi from Tribhuvan International Airport in Kathmandu, I watch the city slip by.[1] The road from the airport to my hotel in Durbar Square is strewn with rubbish. Much of it ends up in riverbeds. You can tell a lot about the way a city runs from its rubbish.[2] Cables are exposed. Pipes run along the surface of the road. They are expensive to bury. Roads are deeply potholed and so the taxi bounces along scraping the bottom. Frequent traffic jams suggest that the roads are not wide enough, or that there are not enough roads. Thousands of motor scooters – the people's transport – fight with buses of different sizes flexibly plying routes across the city. Tangles of electrical wires overhead within easy reach are casually extended into the homes and businesses they once bypassed. People live in ramshackle dwellings often made from corrugated iron and whatever else comes to hand. Damage from the 2015 earthquake is still visible, and the rebuilding turns the city into a giant building site. People make a living selling food and drinks and other small items along the roadside. Seventy per cent of economically active Nepalese operate in the informal economy. There are not enough formal jobs to go around. People make their own work and their own lives in whatever ways they can.



View from a taxi window of Kathmandu's precarious infrastructure.

The challenges of modern cities

Cities are important. They are engines of economic growth, developing modernity, prosperity and widening social inequalities. They function like chaotic junctions routing all kinds of activities and cross currents, in the restless movements of people, objects, opportunities, algorithms and materials. Urban footprints extend beyond city boundaries; indeed some cities seem to *have* no boundaries as the connections they route merge into surrounding periurban and suburban areas. Roughly 60 per cent of the world's population now live in cities. The UN predicts dramatic increases in urban populations to over 6 billion by 2045, with spectacularly high rates of growth in the cities of the global south, especially in Africa and Asia, cities like Kathmandu.

1. All the photographs on pages 27 and 30–31 were taken by the author.
2. Caroline Knowles, 'Untangling the Translocal Urban Textures of Trash: plastics and plasticity in Addis Ababa', *Social Anthropology/Anthropology Sociale*, 25:3 (2017), 288–300.

Cities in developing regions face difficult challenges with few resources. Waves of rural to urban migration, urban population growth, displacements resulting from environmental and political upheavals, and the impacts of climate change, mean that the everyday needs of urban citizens in the coming decades will massively exceed the abilities of nation-state and city authorities to provide them. Poverty (a lack of prospects in formal employment and wages that don't meet living costs), struggles to secure adequate housing, water, food, affordable transport, and health care are just some of the everyday difficulties people live with already: difficulties that will magnify as cities grow. The UN admits that managing urban areas is one of the most important development challenges of the 21st century. And urban infrastructure sits at the centre of these challenges.

Infrastructure – the systems that deliver water, energy, health care, circulation in mass transit and roads, broadband, housing and so on – are the vital connective tissues of city life. Populations living in developed cities in the global north pay little attention to infrastructure because it mostly works and much of it is tucked out of sight. In contrast from my taxi window in Kathmandu I glimpse improvised infrastructure in action. The people who make the city run by stitching together inadequate and poorly functioning systems are perhaps urban infrastructure's most vital component. Despite people's ability to improvise and extend the infrastructures available in cities like Kathmandu around their needs, enormous difficulties stand in the path of infrastructure development. These difficulties are compounded in megacities, cities of over 10 million, like San Paulo (12 million), Mumbai (18 million) and Lagos (21 million). Often at breathtaking speed, megacities in the global south expand their footprints into surrounding areas as their populations grow, in part through rural to urban migration. And so city authorities struggle with the logistical, engineering and financial challenges of providing energy, shelter, water, education and health care to the masses.

The British Academy 'Cities & Infrastructure' programme – the reason I am in Nepal – funds 17 interdisciplinary research teams in the UK with local partners – in cities such as Nairobi, Kampala, Kinshasa, Delhi, Accra, Lahore, San Paulo and Medellin, all facing precisely these challenges. The Cities & Infrastructure programme – which is resourced through the UK government's Global Challenges Research Fund (GCRF) – supports two research projects in Kathmandu, and this article is based on a week spent in Kathmandu with both research teams. It explores my observations and interpretations of their infrastructure research as they share it with me.

While both teams focus on one dimension of infrastructure in the built fabric of the city, other aspects of infrastructure such as water, power, work and sanitation are inevitably interconnected with buildings. This is one of infrastructure's challenges, when everything needs developing or upgrading at once, and the same streets carry different services often delivered by different agencies with different agendas.

Earthquake

The Kathmandu urban cluster, with a population of roughly 2.5 millions[3] is small in comparison to the megacities in which some researchers in the Cities & Infrastructure programme are working. With only 17 per cent of Nepalis living in cities, Nepal is at an early stage in what appears to be an accelerating pace of urbanisation. These factors make it a manageable research laboratory for infrastructure development and experimentation. Kathmandu is also built in an earthquake zone, something its inhabitants are reminded of on a regular basis as their city shifts around them. People remember where they were on 25 April 2015 when an earthquake that measured 7.8 on the Richter scale hit Nepal. With hundreds of aftershocks and another major earthquake on 17 May, it is estimated that around 9,000 people died, many more were injured, and still more traumatised in ways we don't know about. These seismic instabilities compound infrastructure's other difficulties. Along with cities like Mexico City, which straddles an earthquake zone too, seismic safety must be incorporated into building design.

Earthquakes rearrange everything, and in the process expose some of infrastructures' challenges. In Kathmandu on 25 April 2015, many lives were lost and others lay in ruins. Houses, businesses, streets, entire neighbourhoods, and sacred monuments that form the religious heritage of the city, were damaged or reduced to rubble. Local first responders were quickly on the scene pulling people from the rubble, followed by rescue teams from all over the world with special equipment. Those who lay beneath the fallen buildings were the first priority. People ran into open space in case there was further devastation. Few remembered the last major earthquake in 1934.

Among the collapse, the chaos, the widespread disruption and the personal trauma, Kathmandu literally opened up and provided precious glimpses of the city from different angles – from the vantage point of ruin. Opportunities to reimagine and live the city differently – with all that this implies for infrastructure – were the obliquely offered gifts of this terrible tragedy.

A historic opportunity

The earthquake exposed the city's foundations and revealed an earlier urban history than archaeologists had imagined for it. A total of 961 monuments across Nepal were damaged or destroyed. Kathmandu was recognised as a UNESCO World Heritage site in 1979, and its ancient monuments have enormous intangible value in the architecture of its inhabitants' everyday lives. The monuments are the focus of daily existence: a place in which to stage life's most important rituals and connect with

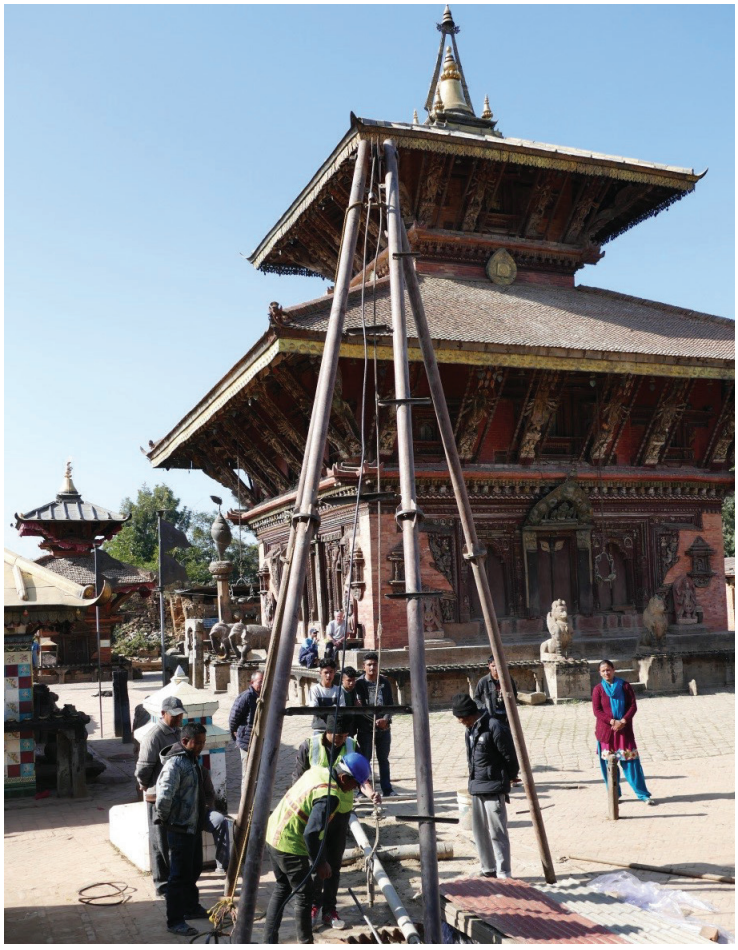
3. 2011 Census this is for the whole metropolitan area.

the gods – Hindu and Buddhist – that make sense of the cosmos. Had the monuments not been so extensively damaged and destroyed, archaeologists would not have had an opportunity to look beneath them. The British Academy team concerned with historic infrastructure[4] got a unique opportunity to 'look down not up'.[5] And in so doing they discovered the 8th-century foundations of a city whose origins were widely regarded to date back to the 10th century – a city beneath a city revealing an unimagined early history of urbanism. The team have deepened understanding of the biography of monuments, as one of the project's local architects put it.[6]

In exposing traces of the city's earlier-than-imagined origins, the research team have reanimated public interest in the monuments, and sparked a public debate about how relics of the past might live in the present, and have a future in local cosmology and as a resource in developing tourism. Which monuments should be rebuilt and which left so as to expose the city beneath? This and other questions are posed in a series of public exhibitions and most spectacularly in the gallery and museum built in the restored palace treasury. The 'Resilience in the Rubble Exhibition', which opened on the third anniversary of the earthquake on 25 April 2018, is in part funded by the British Academy. It displays photographs and recovered artefacts, and invites people to post their experience of the earthquake on the wall.

Prompting individual and collective memory is an opening salvo in promoting a closer alliance between the local people and their spectacular ancient monuments. Might they become involved in routine care and maintenance? How can local artisans play a bigger role in restoration and be properly rewarded for their skill? The master carvers who sculpt the open eyes of the gods must be properly acknowledged and rewarded. This creates tensions with those who favour modern engineering models and methods and low tenders for restoration work.

The earthquake allowed the team to investigate which monuments hold up and why. The strength of earlier restoration work is tested and ways to improve future seismic resilience offered by the team. Sustainability is important. Using traditional materials in restoration means reusing bricks and wood from the rubble, rather than using energy to fashion new materials and dispose of the old. Traditional building techniques favour mud mortar in place of lime and cement, because it is more flexible and thus more resilient. The monuments are thousands of years old and so have survived many earthquakes. But this approach clashes with the modern engineering techniques favoured by most structural engineers, who consider concrete synonymous with strength, and connecting a strong material like cement with a weaker traditional material just causes further damage. Government tendering processes are bureaucratic, slow and must conserve public money: private contractors favour modern methods and profits. Debates about the best way to save the past and face the future rumble on. The earthquake made it possible to learn about what works best, scale it up and roll it out in other cities facing similar disasters.



Geotechnical sampling next to the Changu Narayan Temple in Kathmandu's World Heritage Site. PHOTO: DURHAM UNESCO CHAIR.

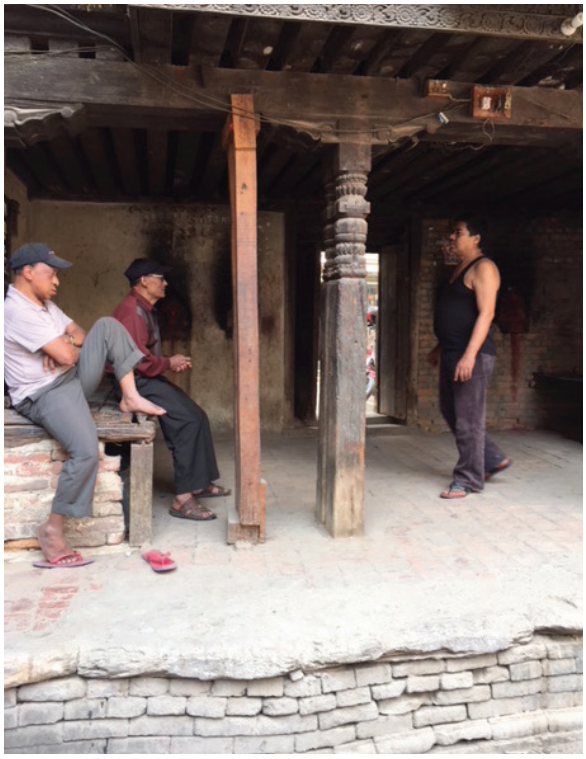
Building stories

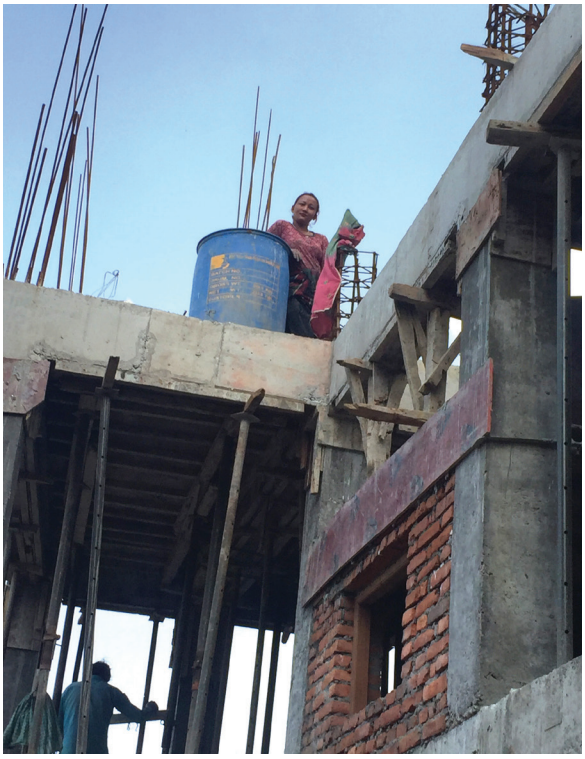
Shifting from the portals connecting heaven and earth to domestic shelter reveals further changes brought by the earthquakes with implications for understanding how infrastructure works in practice, uncovered by the British

4. The team, led by Robin Coningham at Durh am University, is developing a methodology to evaluate and improve the seismic safety of Kathmandu's spectacular antiquities: 'Reducing disaster risk to life and livelihoods by evaluating the seismic safety of Kathmandu's historic urban infrastructure' (www.britishacademy.ac.uk/reducing-disaster-risk-life-and-livelihoods).

5. Robin Coningham, Kosh Prasad Acharya, Christopher Davis, Ram Bahadur Kunwar, Ian Simpson, Anie Joshi and Kai Weise, 'Resilience within the rubble: reconstructing the Kasthamandap', *Spaces*, 14:10 (2018).

6. Special thanks are due to Kai Weise for his knowledge and skill and enormous patience and generosity with his time.





This page: Rebuilding work in Kathmandu. Facing page: the rebuilding of one property destabilises the neighbouring property; the tower-like buildings that Kathmandu families live in to maximise the value of a small plot.

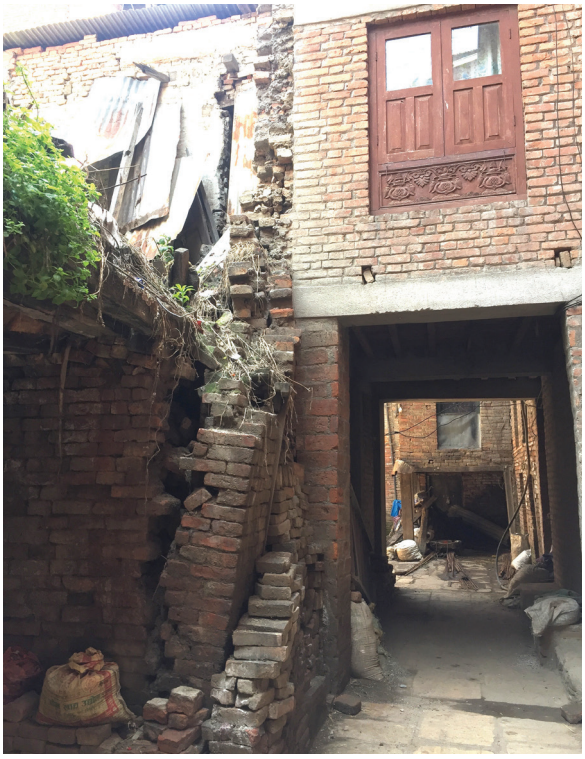
Academy 'self-recovery' team.[7] This team is working in Bhaktapur, part of the Kathmandu urban area along the valley from Kathmandu. Collectors of unrecorded stories, the team listens to people telling their earthquake experiences, revealing hopes and fears.[8] They capture the recent traumatic past and dreams about the future. With little help beyond the immediate rescue operations of international agencies and the slowly unrolling programme of government grants, people are taking the initiative and rebuilding their lives and their homes. There will inevitably be tensions between the short-term response cycle of disaster rescue missions – which have implications for the future – and the careful long-term planning needed to replace damaged infrastructure.

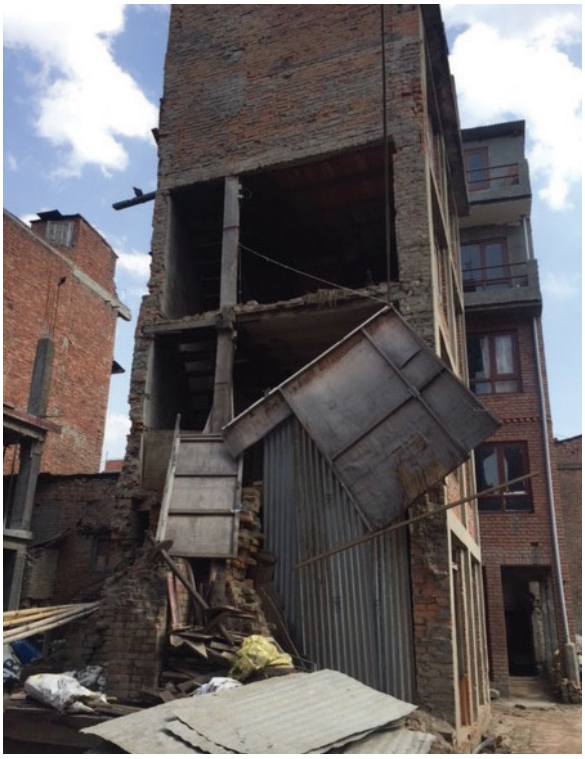
The earthquakes have radically reconstructed streetscapes. Everywhere are piles of rubble, and partially and completely collapsed buildings. There are odd gaps between houses where other houses once stood. Houses are held up with props to prevent further collapse. As houses often lean against each other, there is great potential for disagreement between neighbours over whether and how to rebuild. Improvements by one family can spell disaster for the family next door, as strong repairs in cement further destabilise the building whose occupants are currently unable to repair them. Temporary shelters are still being used three years later. One, built in bamboo, houses an elderly lady with no one to help her rebuild. She has established a garden around the hut's perimeter, and calls it her 'nest'. Some houses are large, shiny and new. Others are half finished but occupied, while families save up to finish putting in doors and windows and add new levels. Some people live in the wreckage in the rubble. The social architectures of the city recreated by the earthquake are legible in these fragmented post-earthquake buildings. The earthquakes may have amplified existing social inequalities and created new ones.

There are new bricks and cement sacks everywhere. The government carted away the old bricks soon after the earthquake and put them in the landfill, precipitously settling any debate that might have ensued about the best way to rebuild. Construction is the dominant activity of the streets and the sounds of hammering and sawing reverberate through the narrow winding streets. The earthquake has turned local people into citizen builders. Women as well as men carry bricks and mix cement. When asked, they reveal quite detailed knowledge of building techniques from watching the 'masons' – the skilled bricklayers – work. Some women have developed building skills, and one completely rebuilt her own house using day labourers when she needed to, in the process reworking traditional designs to increase the space and

7. The team, led by John Twigg at the Overseas Development Institute, explores how people self recover and rebuild their lives after the 2015 earthquake: 'Safer Self Recovery: promoting resilient urban reconstruction after disasters' (www.britishacademy.ac.uk/safer-self-recovery).

8. Special thanks are due to Holly Schofield and Luisa Miranda Morel of Care International – highly skilled and sensitive researchers – for guiding me through the complexities of the team's research and for allowing me to observe their interviews.





the light inside. The earthquake has improved popular knowledge of seismology, and how to build in ways that are stronger – in cement and brick – and more resilient to future earthquakes. Unlike the debates over the monuments, in domestic rebuilding there is no appetite for traditional forms of resilience. Government information on better building is filtering through the population through notices, radio broadcasts and pamphlets.

Tall narrow tower-like buildings are families' response to the cost of urban land. As they moved to the city from their farms and villages, where there had been space to spread out and build new dwellings as families grew, they instead had to occupy small plots of land and live literally on top of each other. Government compensation, distributed on the 'one door' principle, has led to disputes within families over distribution of compensation, with some members moving on and rural ancestral land being sold to fund dispersal. Compensation is a highly bureaucratic process. Some people have secured it and others still wait. New building codes requiring better seismic safety may be incompatible with resilience and self-building. The available money (or loans) and the skills of citizen builders circumscribe the quality of rebuilding. Backlogs and delays cause frustration. And compensation claims must be accompanied by proof of formal land title, which, in systems historically evolved through largely informal customary land rights and practices going back centuries, may prove unworkable. It is hard not to draw the conclusion that the city authorities are using the earthquakes to formalise the city and regulate the lives of its citizens.

Earthquakes change everything. Some of these changes enhance the lives and infrastructures lived in cities, and others worsen them. Some changes invoke the past and ask questions about the future. Mass rebuilding of housing of the kind required in earthquake recovery provides a rare opportunity to build dwellings that people want to live in. Large-scale rebuilding provides opportunities to recycle and build sustainably. It provides opportunities to rethink water supplies and storage, or install solar heating. It provides opportunities to take matters into individual family and community hands, and, like the woman who adjusted the design of her house, reimagine living space and the public spaces in between in ways that support the collective life of the streets.

As the UK Overseas Development Institute 'build back better' concept suggests, disasters are opportunities for improvements, and better infrastructure improves city life for residents. In the normal run of things, cities change slowly in piecemeal and ad hoc ways, but disasters provoke widespread change and, sometimes, the resources to implement it. Changes can be tried out, form the basis of experiments in what does and doesn't work, and be moved on to other places if they succeed. Changes can amplify creativity in infrastructure design and implementation, in dialogue with local knowledge and expertise. These are urgent matters demanding solutions. Otherwise the cities in the global south will be still more broken and dysfunctional as they grow, and their people dispossessed of the basic structures that hold everyday life together.